

CLAIMS

What is claimed is:

- 5 1. An apparatus for cleaning a ship hull, comprising:
 a support frame;
 at least one articulated arm installed on the support frame so as to have a free end, the articulated arm having a plurality of members arranged end-to-end and interconnected by hinge connections;
10 means for dynamically adjusting the hinge connections mounted between respective ones of the members; and
 a brush head assembly mounted at the free end of the articulated arm so as to be positionable by the articulated arm against the ship hull.
- 15 2. The apparatus of claim 1 further comprising at least one stand-off arm mounted on the support frame so as to extend laterally therefrom to space the apparatus from the ship hull during cleaning.
- 20 3. The apparatus of claim 2 wherein the stand-off arm is formed on a distal end with a roller configured to make rolling contact with the ship hull.
4. The apparatus of claim 1 wherein the support frame provides a means for mounting the support frame on a base installed on a carrier, the carrier being selected from the group consisting of a land mass, a pier, a dock, a land vehicle, and a boat.
- 25 5. The apparatus of claim 4 wherein the frame is enabled for rotation relative to the base.

6. The apparatus of claim 4 wherein the apparatus is configured with a counterweight positioned for counterbalancing a weight and a movement of the articulated arm so as to stabilize the frame.
- 5 7. The apparatus of claim 1 wherein the adjusting means is selected from the group consisting of at least one hydraulic cylinder, hydraulic ram, hydraulic motor, pneumatic cylinder, pneumatic ram, pneumatic motor, and a motor.
8. The apparatus of claim 1 further comprising a means for monitoring positions of the
10 brush head assembly.
9. The apparatus of claim 8 wherein the monitoring means is selected from the group consisting of a sensor, a motion detector, and a camera.
- 15 10. The apparatus of claim 1 wherein the articulated arm includes three members, each such member being at least three feet in length.
11. The apparatus of claim 1 wherein the brush head assembly includes:
a yoke pivotably mounted on the free end of the articulated arm;
20 at least one brush drum rotatably mounted within the yoke; and
a means for driving each such brush drum, the driving means installed on the yoke in engaging relationship with each respective brush drum in rotational motion.
12. The apparatus of claim 11 wherein the yoke is configured for mounting two brush drums
25 in a substantially parallel, spaced-apart arrangement.
13. The apparatus of claim 12 wherein a means for dynamically pivoting the yoke about the free end of the articulated arm is mounted therebetween, the pivoting means being

operable to selectively pivot the yoke such that the two brush drums are substantially in contact with the ship hull during cleaning.

14. The apparatus of claim 11 wherein:

5 the yoke is configured with opposing foot plates that are substantially triangular in shape, the yoke being mounted on the free end of the articulated arm so as to pivot substantially about the centers of the respective foot plates; and

three brush drums are mounted within the yoke between the foot plates substantially at respective corners of the foot plates and in a substantially parallel, spaced-apart arrangement,
10 the yoke being freely pivotable such that two of the three brush drums are substantially in contact with the ship hull during cleaning.

15. The apparatus of claim 1 further comprising at least one pressure nozzle mounted on the brush head assembly and positioned so as to selectively direct a pressure spray toward
15 the ship hull substantially adjacent to the brush head assembly.

16. A method of cleaning an underwater hull of a ship, comprising the steps of:

locating the ship and a ship hull cleaning apparatus adjacent to one another;

interconnecting an articulated arm having a plurality of members with hinge connections

20 and dynamically manipulating the hinge connections through a hydraulic system;

positioning the articulated arm so that a brush head assembly, mounted on the free end of the articulated arm, is in contact with the ship hull; and

rotating a brush mounted within the brush head assembly to clean the ship hull.

25 17. The method of claim 16, comprising the further step of spacing the apparatus from the ship by contacting the hull with at least one stand-off arm mounted on the apparatus.

18. The method of claim 16, comprising the further steps of:

installing the apparatus on a carrier selected from the group consisting of a land mass, a pier, a dock, a land vehicle, and a boat; and

rotating the apparatus relative to the carrier about a rotatable base mounted on the carrier so as to cooperate with the articulated arm in contacting the ship hull with the brush head assembly.

19. The method of claim 16, comprising the further step of spraying the hull adjacent to the brush head assembly with a pressurized spray directed from a nozzle positioned on the brush head assembly.

20. The method of claim 16, comprising the further steps of:

monitoring the positioning of the brush head assembly and the rotating of the brush to provide monitoring data through a monitoring device selected from the group consisting of a sensor, a motion detector, and a camera; and

controlling the positioning of the brush head assembly and the rotating of the brush based on the monitoring data.